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(54) Device for remote pouring of concrete.

(57) Device for remote pouring of concrete comprising a displaceable frame (2), a jib (3) mounted movably on the frame and comprising a number of jib parts (5, 6, 7) connected movably to each other and a concrete conduit (15) arranged along the jib parts which comprises coupling pieces (20) permitting the mutual movement of jib parts. The jib parts are telescopically extensible.

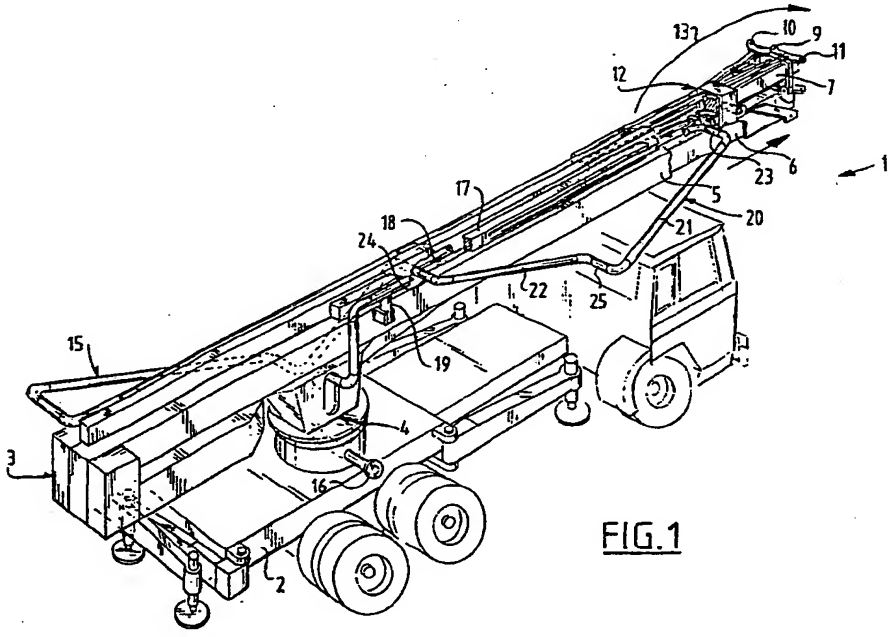

FIG.1

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DEVICE FOR REMOTE POURING OF CONCRETE

The invention relates to a device for remote pouring of concrete comprising a displaceable frame, a jib mounted movably on the frame and comprising a number of jib parts connected movably to each other and a concrete conduit arranged along the jib parts which comprises coupling pieces permitting the mutual movement of jib parts.

In such a known device the jib parts are pivotally connected to each other at their ends and the mutual swivel angle of the jib parts can be controlled using a hydraulic piston-cylinder unit. The end of the jib where the end of the concrete conduit is situated can be maneuvered by appropriate control of the hydraulic driving to any desired position so that concrete can be poured at any position within an area covered by the outer end of the jib.

The known device has the drawback that it cannot operate inside spaces with a limited height and a floor for example cannot therefore be poured herewith in an already constructed building. This is because for pouring concrete at distances from the frame which are shorter than the maximum distance the jib must fold upward.

The object of the invention is to provide a device of the type specified in the preamble with which it is possible to pour concrete over a surface area in a space with a limited height.

In the device according to the invention this is achieved in that the jib parts are telescopically extensible. During use the jib can protrude horizontally and, for pouring concrete at distances smaller than the maximum, the jib is simply retracted so that no extra space is needed in the height. With the device according to the invention a concrete floor can thereby be properly poured in a building with a limited height.

The coupling pieces in the concrete conduit can be formed by hoses. In preference however, the construction of claim 2 is applied. This construction is solid and wear-resistant and is easily manageable in the case it has to be detached for removing blockages.

A further development of the invention is characterized in claim 3. The jib with the concrete conduit mounted thereon can be fully retracted without parts having to be disassembled. The device according to this embodiment is therefore ready for use very rapidly and can be very quickly removed again after completion of work. A very favourable further development is characterized in claim 4. Through the use of the telescopic jib the finishing head at the end of the jib can be displaced uniformly in a straight line by extending or retracting the jib. The poured concrete can thus be directly finished using the finishing head without further manual operations.

The finishing beam is preferably a vibrating beam so that the surface of the poured and smoothed concrete obtains a high quality.

In the use of the preferred embodiment of fig. 6 concrete can also be poured and finished with the device according to the invention in places difficult of access such as along walls, around columns and the like. The finishing head can, for instance by being rotated into a suitable position, also operate when the jib is turned about its vertical rotational axis.

In preference the finishing head is connected height-adjustably to the jib by height adjusting means as characterized in claim 7. Any dipping movements of the jib that may for instance occur when the concrete is supplied using a pulsating concrete pump can be compensated by the height adjusting means so that a precisely flat floor can nevertheless be obtained despite these movements. In a suitable embodiment the sensor means are per se known means reacting to a laser reference.

The invention will be further elucidated in the following description with reference to an embodiment shown in the figures.

Fig. 1 shows in perspective view a device according to a preferred embodiment of the invention in the transporting position.

Fig. 2 is a partly broken away, perspective view of the device of fig. 1 in the position of use with a finishing head attached thereto.

Fig. 3 is a perspective view of the finishing head.

The device 1 shown in fig. 1 is embodied as mobile truck, on the frame 2 whereof is mounted a jib 3. By means of a bearing construction 4 the whole jib is rotatable about a vertical rotational axis.

The jib 3 is telescopic and comprises a first part 5, a second jib part 6 slidable in lengthwise direction thereof and a leading or third jib part 7 mounted slidably in lengthwise direction on the front end of the second jib part 6 by means of a guiding construction 12.

In the embodiment shown the jib can be further elongated using an extension piece 8 that is connected to the front end of the jib part 7 for sideways swivelling by means of a hinge 9. This extension piece 8 can be pivoted forward about the hinge 9 in the direction of arrow 13 in fig. 1, wherein holes 10 come to lie in one line with holes 11 in a support at the forward end of the third jib part 7. A locking pin is placed through these holes 10 and 11 lying in one line for fixing the extension

piece 8 in the swivelled out position.

In order to be able to transport concrete from the place where the frame 2 is disposed to the outer end of jib 3 a concrete conduit 15 is arranged along the jib. Arranged in the bearing construction 4 for the jib is a connection 16 to which is connected a concrete pump. This connection 16 is joined to the concrete conduit 15 via per se known rotatable couplings.

A first portion of the concrete conduit 15 extends along a supporting beam 17 extending substantially parallel to the first jib part 5 and mounted thereon by means of a support 19. A leading portion of the concrete conduit 15 is mounted directly against the third jib part 7. Arranged between the end of the concrete conduit portion fitted along supporting beam 17 and the concrete conduit portion fitted along jib part 7 are two coupling pieces 20 which permit a relative movement of the said concrete conduit portions 15 during extending or retracting of the jib parts.

As shown in fig. 1 and 2, each coupling piece 20 comprises a first tube portion 21 and a second tube portion 22, each of which are connected via the respective 90° couplings 23 and 24, which are rotatable about an axis transversely of the jib, to a conduit portion connected to a different jib part. The tube portion 21 of the coupling piece 20 on the right-hand side of the jib is connected with its end via the 90° coupling 23 to the conduit part arranged along the supporting beam 17. Tube portion 22 is connected via the 90° coupling 24 to a transverse conduit part mounted on the end of a supporting beam 18 which protrudes rearward from the head of the second jib part 6. Then further connected to this tube portion is a similar coupling piece 20 which leads to the concrete conduit part arranged along the third jib part 7.

When the jib 3 is extended from the retracted transport position shown in fig. 1 to the extended operating position shown in fig. 2, the first and second tube portions of the coupling pieces swivel past one another. Through the use of two coupling pieces connected one after the other as shown in fig. 2 the length of each tube portion 21, 22 can be smaller than the height of jib 3 in the horizontal position so that the bottom end of the tube portions remains clear of the ground as they swivel past one another.

Likewise arranged along the extension piece 8 is a concrete conduit part which is coupled via a rotatable coupling to the front end of the conduit part along the third jib part 7.

As is shown clearly in fig. 2, with the device according to the invention concrete can be poured remotely inside a building 28 of limited height. The whole surface area of the floor to be poured can be reached by swivelling movement about the bearing construction 4 and by retracting and extending the jib. The height required for the device 1 remains limited in any of the possible positions of the jib.

It is noted that the jib cannot be extended directly from the transporting position shown in fig. 1 because the coupling pieces 20 would come into contact with the cabin of the truck. Prior to sliding out, the jib is first turned through 120° so that the jib is extended in rearward direction relative to the truck.

The concrete coming out of the end of the concrete conduit 15 close to the front end of the jib can be poured directly at the required location and be finished manually. However, since the front end of the jib can be moved well horizontally because it is telescopic, a finishing head 30 is used in accordance with the further development of the invention. As shown in fig. 2, and in fig. 3 in more detail, the finishing head 30 comprises an auxiliary frame 32 suspended from the end of jib 3, in the present embodiment from the end of extension piece 8, which frame carries a spreader plate 35 and, at an interval in front of the latter, a finishing beam 37. The outlet 36 at the end of the concrete conduit 15 is oriented such that the concrete therefrom falls onto spreader plate 35. The concrete is distributed as it flows over this spreader plate 35. When in the situation shown in fig. 2 the jib is therein gradually retracted, the vibrating beam 37 moves over the newly poured concrete, giving a smooth finish.

In the finishing head 30 the auxiliary frame 32 is rotatably mounted on a vertical axis. Auxiliary frame 32 bears a rotary crown 33 which can be rotated using a pinion 34. Pinion 34 is driven by a motor connected fixedly to the end of the jib. By setting this motor into operation the auxiliary frame 32 with spreader plate 35 and vibrating beam 37 can be turned in the direction of arrow 38. When turned through 90° relative to the position shown in fig. 2 and 3, concrete can for instance be poured and finished while the jib 3 is rotated on its vertical axis of rotation.

The finishing head 30 is further height-adjustably connected to the end of the jib. This adjustability is obtained using a telescopic guiding formed by tubes 40, 41. The concrete conduit is integrated into this telescopic guiding. The vertical position of the auxiliary frame 32 relative to the end of the jib is set using a hydraulic cylinder 42 fed via lines 44.

In another embodiment, height adjustment can be performed manually through appropriate operation of the hydraulic cylinder 42. Automatic height adjustment is however preferably applied, which ensures that the finishing head remains at a fixed level independently of possible vertical movements of the end of the jib. In order to achieve this, per se known sensor means 31 are used which react to an

external height reference. The external height reference can be formed in per se known manner by a rotating laser beam which thus defines a plane. Sensor means 31 may be embodied such that a sensor head 45 thereof detects the laser beam and generates control signals wherewith cylinder 42 is controlled in order to hold the sensor head 45 at a constant height. Any dipping movements of the jib, for example when used in co-operation with a pulsating concrete pump, can thus be compensated.

Claims

1. Device for remote pouring of concrete, comprising a displaceable frame, a jib mounted movably on the frame and comprising a number of jib parts connected movably to each other and a concrete conduit arranged along the jib parts which comprises coupling pieces permitting the mutual movement of jib parts, **characterized in that** the jib parts are telescopically extensible.

2. Device as claimed in claim 1, **characterized in that** a coupling piece is formed by a first and a second tube portion each of which are connected with one end via a 90° coupling, which is rotatable about an axis transversely of the jib, to a conduit part connected to a different jib part, and are connected with their other ends to one another via 90° couplings likewise rotatable about an axis transversely of the jib such that when the ends connected to the conduit parts are moved past each other the tube portions swivel past each other.

3. Device as claimed in claim 2, **characterized in that** the jib comprises three telescopically extensible jib parts and that the concrete conduit comprises two coupling pieces which are mutually connected halfway along the central jib part and each of which is connected with its other end to a conduit part on the first and third jib part respectively.

4. Device as claimed in any of the foregoing claims, **characterized in that** on the free end of the jib is arranged a finishing head comprising a spreader plate distributing concrete supplied by the concrete conduit and a finishing beam arranged at an interval therefrom.

5. Device as claimed in claim 4, **characterized in that** the finishing beam is a vibrating beam.

6. Device as claimed in claim 4 or 5, **characterized in that** the spreader plate and finishing beam are arranged on the jib for rotation as an entity about a vertical axis.

7. Device as claimed in any of the claims 4-6, **characterized in that** the finishing head is connected height-adjustably to the jib by height adjusting means and that the height adjusting means comprise sensor means reacting to an external height reference for holding the finishing head at a constant height relative to the surrounding area.

8. Device as claimed in claim 7, **characterized in that** the sensor means are means reacting to a laser reference.

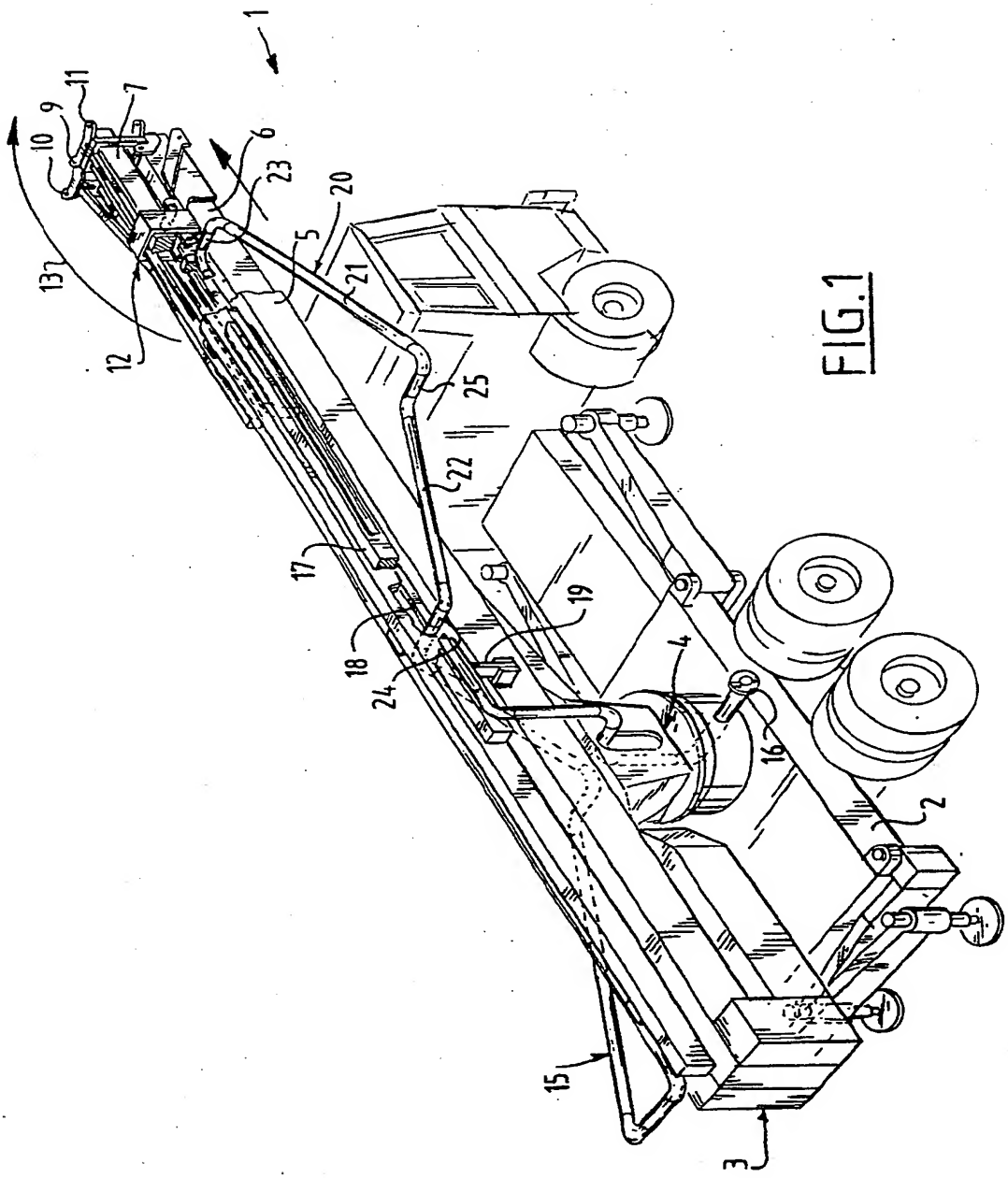

FIG.1

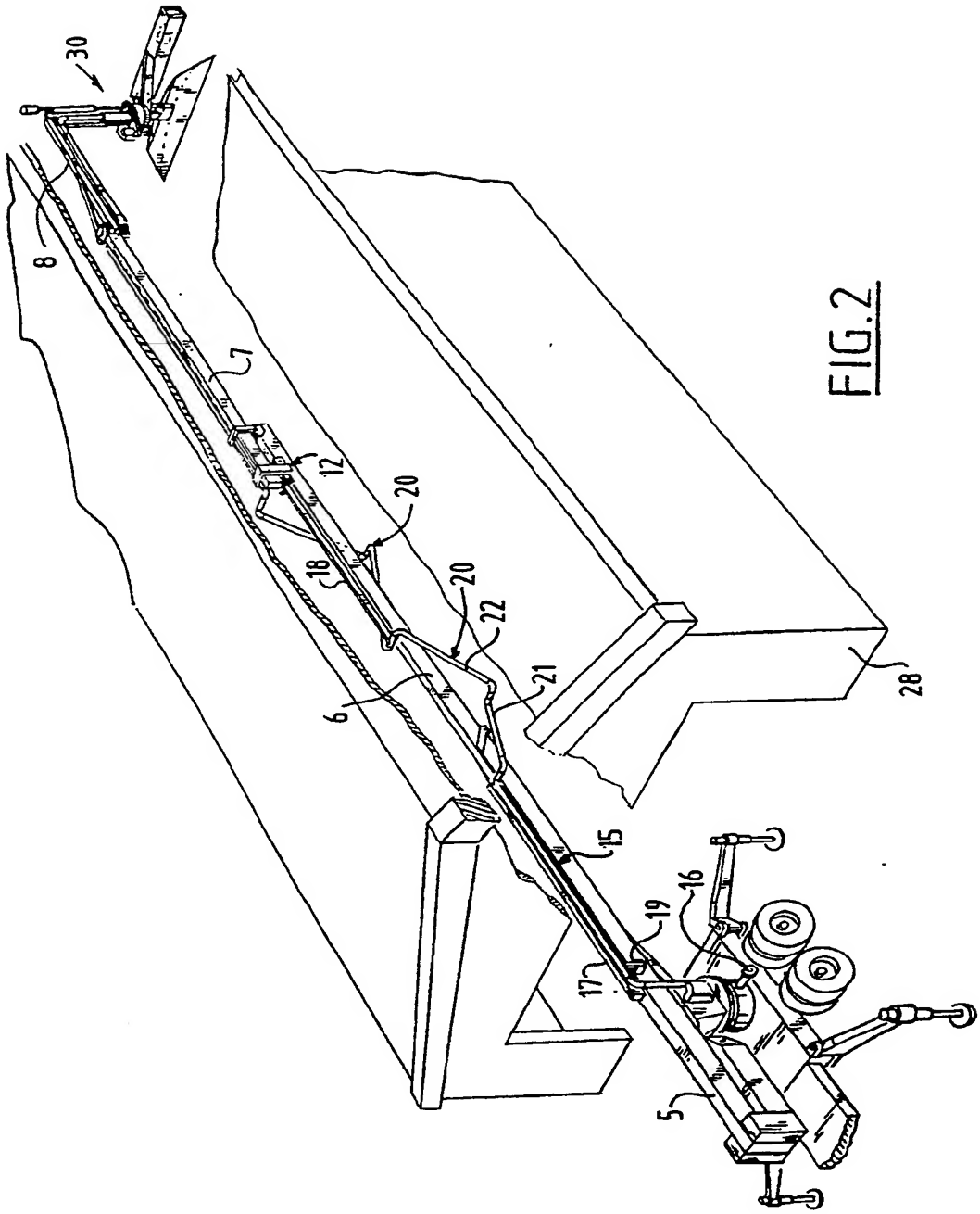

FIG.2

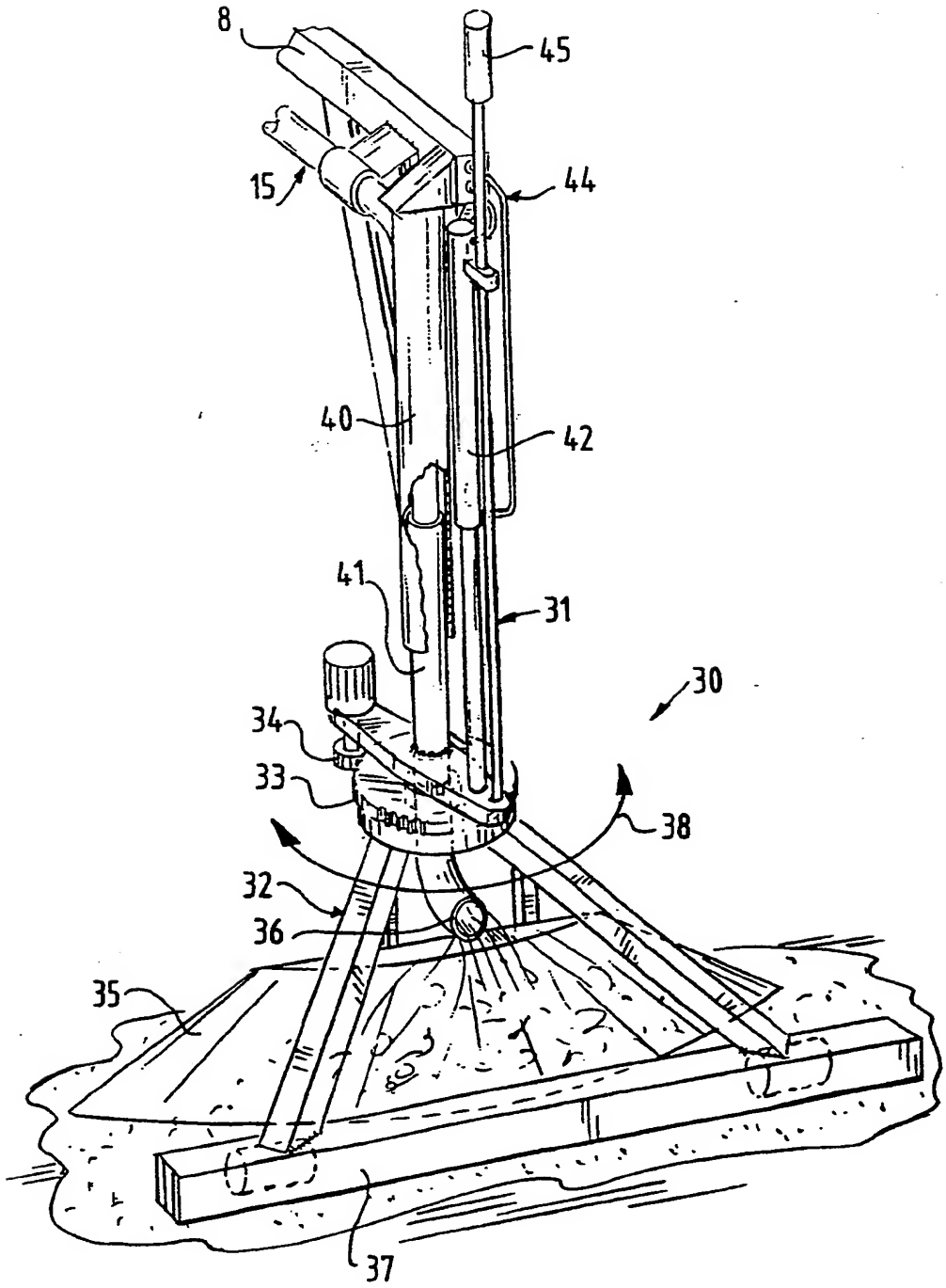

FIG.3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 20 3261

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	US-A-4 130 134 (CASTLE) * Columns 4-9; column 10, lines 1-49; figures 1-14 *	1,2	E 04 G 21/04
A		3	
X	US-A-3 942 554 (WERNER) * Column 3, lines 13-68; column 4; column 5, lines 1-40; figures 1-7 *	1,2	
A		3	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

E 04 G

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	13 March 91	VIJVERMAN W.C.

CATEGORY OF CITED DOCUMENTS

X: particularly relevant if taken alone
Y: particularly relevant if combined with another document of the same catagory
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E: earlier patent document, but published on, or after the filing date
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